



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/511,912	02/23/2000	Tatau Nishinaga	JEL 31015	4100

7590

08/12/2002

Stevens Davis Miller & Mosher LLP  
1615 L Street NW  
Suite 850  
Washington, DC 20036-4387

EXAMINER

ANDERSON, MATTHEW A

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 08/12/2002

19

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/511,912

Applicant(s)

NISHINAGA, TATAU

Examiner

Matthew A. Anderson

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 7-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 11-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 February 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6, 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (6,377,596 B1) in view of Tokunaga et al. (US 5,425,808) and Nakamura et al. (JP 01-234389A).

Tanaka et al. discloses a method of lateral epitaxial overgrowth of nitride semiconductors (i.e. III-V compound semiconductors such as GaN and alloys). In Fig. 3 the method is shown. A substrate of single crystal sapphire (1) has an amorphous insulating layer of SiO<sub>2</sub>, Si<sub>3</sub>N<sub>4</sub> (SiN<sub>x</sub>), SiO<sub>2</sub>:P<sub>2</sub>O<sub>5</sub> (PSG), SiON, or Ta<sub>2</sub>O<sub>5</sub> is grown on the substrate and then patterned. Nitride semiconductor material is grown epitaxially up out of the pattern and laterally over it (Figs. 3C-3E).

Tanaka et al. does not use MBE as the method of nitride semiconductor growth.

Tokanaga et al. discloses prior art in which GaAs (a known III-V semiconductor compound) is laterally overgrown on an amorphous SiO<sub>2</sub> or Si<sub>3</sub>N<sub>4</sub> film. (col. 2 lines 14-29). Tokanaga et al. suggests the equivalence of MBE (molecular beam epitaxy) and CVD (chemical vapor deposition for growth of epitaxial films. (col. 1 lines 30-35, and

Art Unit: 1765

col. 7 lines 15-24. Additionally, the use of such method to grow other III-V compounds (such as GaN) was also suggested.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine the references above because Tokanaga et al. suggests an equivalent method of growing selective epitaxial nitride films upon amorphous masking layers thus increasing process flexibility.

The above combination does not teach the angle of incidence required by the claims.

Nakamura et al. discloses a molecular ray method of performing epitaxy with Ga, Al, and As. Nakamura et al. discloses optimization of the angle of incidence between the substrate and the molecular ray (i.e. beam). The angle can be optimized between 0-90 degrees.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine Nakamura et al. with the previous combination because Nakamura et al. discloses optimization of the angle of incidence between the substrate and the molecular ray (i.e. beam) in order to positively affect the product. The motivation for combining would be the optimal crystal thereby formed.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to optimize the incident angle between the substrate surface and the beam during lateral overgrowth of a single crystalline film on a patterned insulating amorphous film which lies on a single crystalline substrate from the exposed seed substrate because such is suggested by the combination of references, such

Art Unit: 1765

optimization would have been achieved with only routine experimentation, and such optimization would have anticipated results.

In regard to claim 11, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form linear openings in the amorphous film of a certain width because these limitations would have been obvious design choices based on Tanaka's figures and description.

In regard to claim 14, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form a single crystalline film with a defect density not more than  $10^4 \text{ cm}^{-2}$  because such is directly suggested in Tanaka et al. as possible with such an overgrowth method. (see col. 6 lines 1-10)

In regard to claims 15-16, it would have been obvious to one of ordinary skill in the art at the time of the present invention to grow films with lattice constants different from the substrate because Tanaka et al. suggests GaN can be grown on sapphire substrates which have an inherent and distinct lattice constant.

In regard to claim 17, it would have been obvious to one of ordinary skill in the art at the time of the present invention that the single crystalline substrate be of a material different than that of the beam used because Tanaka used a sapphire ( $\text{Al}_2\text{O}_3$ ) single crystalline substrate and grew GaN thereon by ELO. Thus, the substrate material and the beam material may be different according to Davis.

In respect to claim 18, it would have been obvious to one of ordinary skill in the art at the time of the present invention to grow a single crystalline film epitaxially on a surface of a substrate which has a different molecular structure and is not an alloy of the

Art Unit: 1765

single crystalline film grown thereon because Tanaka et al. grows epitaxially GaN on a sapphire substrate.

### ***Response to Arguments***

4. Applicant's arguments with respect to the cited references have been considered but are moot in view of the new ground(s) of rejection.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., YBCO on a SrTiO<sub>3</sub> substrate) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

The argument that Tokunaga teaches away from the present method is not convincing. In the new ground of rejection, Tokunaga merely suggests the equivalence of MBE and MOCVD (i.e. MOVPE) as a deposition methods.

The examiner points to col. 7 lines 15-25 as evidence that the MBE or MOCVD are interchangeable in growing III-V semiconductors epitaxially by lateral overgrowth. The examiner also notes the applicant's statements concerning the nature of deposition beginning at the bottom of page 9 of paper # 13 and that they are not in the form of an affidavit.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Anderson whose telephone number is (703) 308-0086. The examiner can normally be reached on M-Th, 6:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3599 for regular communications and (703) 305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

MAA  
August 8, 2002

  
GREGORY MILLS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700